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Trading Strategy for Firms in Financial Distress

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Abstract

This paper tests two hypothesis 1) that firms entering financial distress incur costs that depress the stock price 2) firms entering financial distress are over sold, and the year after they enter financial distress the price bounces back. The paper tests a simple trading strategy of buying the distressed firm and selling the largest firm in the industry. The strategy yields an average return of 10.16%. The returns are enhanced by sorting firms by price to book and selecting firms from the highest quartile, yielding an average return of 34.75%

It is important to determine what exactly it means for a firm to enter financial distress. There are many different proxies for financial distress. Campbell, Hilscher, Szilagyi (2008) and O'Doherty (2009) use a 12-month-forward looking estimate of failure risk, adjusted every January from 1981 to 2003 using historical data. Garlappi and Yan (2011) define financial distress as when shareholders either enter into strategic renegotiations with debt holders or the firm files for bankruptcy. Vassalou and Xing (2004) use a value called distance-to-default based off of the Black-Scholes model. They use the value of the firm's liabilities as the strike price, when the value of the firm's assets are less than the strike price the value of equity is zero. Whitaker (2000) defines the beginning of financial distress as the first year in which cash flow is less than current maturities of long-term debt. Firms have many options to cover current maturities but many of those options come at a cost; these costs may affect the firm's performance in the long run. Because of this issue a forward-looking estimate would not accurately calculate costs of financial distress. Naturally firms will have a net cash flow less than current maturities before they file for bankruptcy or enter into negotiations with debt holders. Therefore if financial distress is classified as bankruptcy, renegotiation, or default you may miss some firms that incur costs of financial distress but recover via other methods. The proxy for financial distress in this paper is a year with cash flow less than current maturities in order to account for all costs or benefits of financial distress.

This paper centers on the idea that there are costs associated with financial distress. Alderson and Betker (1996) find that complete liquidation can consume over one third of firm value; although the firms in this paper will not undergo complete liquidation. They also find a negative relationship between liquidation costs and fixed-to-total assets, a positive relation between market-to-book ratio liquidation costs and a positive relation between research and

development expenses and liquidation costs. Zhang (2011) looks at a shareholder advantage that affects renegotiation frictions from the dispersion of ownership and complexity in capital structure. Bondholder dispersion, shareholder dispersion and short term debt are used to proxy for renegotiation frictions. For firms with only private debt there is a significant negative relation between distress risk and stock returns. Therefore there is a strong shareholder advantage in firms with only private debt. On the other hand shareholder advantage is not observed for firms with private and public debt. Giffin and Lemmon's work (2002) show that firms with high distress risk exhibit the largest return reversals around earnings announcements. They also argue that book-to-market return premium is biggest for small firms with low analyst coverage, as is also supported by Campbell, Hilscher, and Szilagyi (2008)

Garlappi and Yan (2011) argue that for most firms there is a hump-shaped relationship between equity beta, as well as between expected returns and default probability. That is only true if there is a chance that shareholders will recover from financial distress. In addition they argue momentum profits in stock returns are more pronounced when there is high default probability.

This paper tests a hypothesis that firms which enter financial distress will earn below normal returns and develop a trading strategy designed to generate abnormal returns. Whitaker (2000) finds that in the five years following financial distress the industry adjusted market value declines 57.07% with an average annual decline of 11.29%. He finds that the costs of financial distress increases with severity of financial distress, improvement in the industry, and reductions in capital expenditures. In addition he finds costs of financial distress decline with cost saving management actions, and increased stock holdings by the board of directors. Campbell, Hilscher, and szilagyi (2008) run a similar analysis with similar results. They find that distressed

portfolios have low average returns, high standard deviations, and high market betas. They tend to perform poorly when market wide implied volatility increases. They argue that value and size effect are not great proxies for financial distress. On the other hand Vassalsou and Xing (2004) found conflicting evidence. They find that small firms earn higher returns than big firms if they have high default risk, also value stocks outperform growth stocks if they both have high default risk. O'Doherty (2009) argues that a conditional version of CAPM can explain abnormal returns for financially distressed stocks.

Sample Selection and Methodology

A firm experiences financial distress when cash flow is less than current maturities. When a firm experiences financial distress they have many options to raise cash to prevent a default including lowering inventory, selling assets, drawing from a line of bank credit or utilizing cash reserves. Many of these options to raise cash come at a cost. Vassalsou and Xing (2004) (VX hereafter) argue that some firms can recover from financial distress and out perform their industry particularly if they are small value firms. Other research has shown contrary evidence. Campbell, Hilscher, and szilagyi (2008)(CHS here after) and Whitaker (2000) find that the industry adjusted stock returns of distressed firms declines even after recovery from financial distress. This contradicting evidence creates two competing hypotheses that a portfolio with that is short a firm recovering from financial distress and long the industry leader will yield abnormal returns or a portfolio long a firm recovering from financial distress, and short the industry leader will yield abnormal returns because the distressed firms are oversold.

This paper samples firms which enter financial distress between 2002 and 2006. The firms are selected from Compustat. The sample is selects the thirty most severely distressed firms in each of the five years. Severity of financial distress is defined as:

$$(CMLTD - CF)/TA$$

Where

CMLTD: Current maturities of long term debt

In order to observe long term effects of financial distress relevant stock performance is pulled from CRSP for the three years following entry into financial distress. For comparison purposes the stock and accounting data was also pulled for the three years preceding entry into financial distress. Firms with cash flow less than current maturities of long term debt in the past 3 years were excluded from the sample to ensure the firms are entering financial distress for the first time. The industry leader of the distressed firm's industry is defined by a firm with the same SIC code as the firm in financial distress with the largest market cap. In addition the industry leader must have over a billion dollars in assets and cannot be in financial distress. If a firm did not have a qualifying industry leader then it was removed from the sample.

The test of two means is used to test a hypothesis that excess returns can be generated using a trading strategy of

$$R_{L_t} - R_{FD_t}$$

Where t=1,2,3

$$(R_{L_t} - R_{FD_t}) - S\&P500$$

Where t=1,2,3

Literature suggests certain firm variables are significant predictors of the performance for the distressed firm. The variables are size, severity of financial distress, market to book value of equity, leverage, and research and development expense; up to two outliers where removed from each year based on these variables. Previous research has shown conflicting evidence whether or not the size and value effects have an influence of stock returns of firms under financial distress. The value effect can be measured with a ratio of the market value of equity to the book value of equity. A firm with a low market to book ratio is known as a value stock and if the firm has a high market to book it is known as a growth stock. The relationship between a firm's size and its stock return is known as the size effect. VX argue that small firms earn higher returns than big firms if they have high default risk, also value stocks outperform growth stocks if they both have high default risk. On the other hand, CHS find evidence supporting the idea that a firm's size and value do not have a significant relationship to market returns. One major difference between the studies done by VX and CHS is the proxy used to determine if a firm is in financial distress, CHS uses their own scale for financial distress composed primarily of backward looking financial data; Whereas VX's model for financial distress applies the firms value of assets and value of liabilities to the black- Scholes model. The difference in the results can also possibly be attributed to different variables which were controlled for. VX focused on size, Book to market ratio and the amount of risk of default. On the other hand CHS looked at beta, market volatility, net income to total assets, leverage, and market value. CHS finds that highly leveraged stocks are more likely to fail than less leveraged stocks, but if they do not fail they have high average returns. Alderson and Betker (2001) find firms with research and development expense have higher costs of financial distress which would indicate they would not perform as well.

The following regression determines the relationship between the difference in returns of the firm in financial distress and the industry leader and the significant firm variables, size, severity of distress, market to book ratio leverage and research and development expense.

$$R_L - R_{FD} = \alpha + b_i\, RD_0 + b_2 \frac{D}{W_0} + b_3 \frac{M_E}{B_E} + b_4 \frac{CF - CMLTD_0}{TA_0} + b_5\, Size$$

Where:

R_L= the percentage return of the of industry leader (based on market cap) from the year the firm enters financial distress for the following three years

R_{FD}= the percentage return of the firm in financial distress from the year it enters financial distress for the following three years

RD= amount which the firm spent on research and development in the year which the firm enters financial distress divided by total assets

$\frac{D}{W_0}$= measurement for leverage by dividing the total book value amount of debt of the firm by the book valueworth of the firm (in the year the firm entered financial distress)

$\frac{M_E}{B_E}$= the total market cap of share (number of shares x price per share) divided by the book value of shares

$\frac{CF-CMLTD_0}{TA_0}$= Severity of financial distress: cash flow (net income+ depreciation and amortization) –current maturities of long term debt / total assets.

Size= log of market cap of firm (number of shares x price per share)

The regression above uses the difference between the industry leader and the firm in financial distress; whereas the regression below includes the return of the S&P 500. Subtracting the return of the S&P 500 provides the abnormal return produced from longing the industry leader and shorting a firm in financial distress.

$$(R_L - R_{FD}) - R_{S\&P\,500} = \alpha + b_i\, RD_0 + b_2 \frac{D}{W_0} + b_3 \frac{M_E}{B_E} + b_4 \frac{CF-CMLTD_0}{TA_0} + b_5\, Size$$

Where:

$R_{S\&P\ 500}$= represents the return of the overall market. Calculated as the percentage return of the S&P 500 from the year the firm enters financial distress for the following three years.

Using the regression above the sample is split into four portfolios based on the variables which are most significant in the regression. Shorting the firm in financial distress and longing the industry leader. Each of the portfolios represents a quartile of a statistically significant variable from high to low. The average return of each portfolio is then found. If there is a significant difference in return between the four portfolios it will give more clear insight on which variables to look for when creating a portfolio that is short a firm in financial distress and long an industry leader.

Empirical Results

This section reports (1) the change of firm value relative to the industry leader after entering financial distress, and (2) which qualities of the firm will make the change significant.

Change in Firm Value After Experiencing Financial distress

Table 1 reports the performance of the stock of a firm that enters financial distress, the stock performance adjusted against the industry leader, and also against the S&P 500. The year after the firm enters financial distress firm value increases an average of 24.85%. Two years after the firm enters financial distress firm value increases an average of 12.79%. The firm in financial distress outperforms the industry leader on average by 10.16% and .632% one and two years following entry into financial distress respectively. On average, the distressed firms

outperformed the market by 14.43% and 14.90% one and two years following entrance into financial distress respectively.

Table 1. Mean change in market value following entry into financial distress N=93
Table 1 reports the mean percentage change in firm value for a distressed firm, after adjusted by subtracting returns of the industry leader, and by subtracting the market return from the distressed firm's return.

year	Unadjusted r_{fd1}	Adjusted $r_{fd1} - r_l$		vs. market $r_{fd1} - S\&P500$	
	Return	Return	t stat	Return	t stat
+1	.2485	.1016	2.408	.1443	12.379
+2	.1279	.00632	-0.063	.1490	1.45

These results are in line with Vassalsou and Xing (2004) who found that firms earn higher returns than big firms if they have high default risk. These initial results support the second hypothesis.

Determining post-financial distress firm performance

Previous literature has provided evidence about which characteristics of a firm are significant in the performance of the stock after entering financial distress. The literature suggests that research and development expense, leverage, severity of distress, price to book and size could all be significant in predicting stock performance after entering financial distress. Table 3 reports the results from the regression. Size, measured my market value, is the most significant variable as displayed in table 3 size tends to have one of the highest t statistics in most of the five years. Furthermore price to book seems to be a significant variable with a significant t statistic in most years. Campbell, Hilscher, and Szilagyi (2008) came up with opposite results,

and state that these two variables do not play a significant role. The difference in results could be contributed to two differences, (1) the Campbell, Hilscher, and Szilagyi sample used a much later proxy for financial distress, and (2) the Campbell, Hilscher, and Szilagyi sample also smaller firms.

Table 2. Descriptive Statistics of Independent Variables N=93

Table 2 reports the means, medians and correlation coefficients of the independent variables used in the cross-sectional regression

	MEAN	*MEDIAN*
RD	*60.59*	*30.016*
D/W	*34.76*	*33.754*
$\frac{M_E}{B_E}$	*3.298*	*2.858*
$\frac{CF - CMLTD_0}{TA_0}$	*.013*	*.02*
size	*3430.16*	*2205.22*

	RD	*D/W*	$\frac{M_E}{B_E}$	$\frac{CF - CMLTD_0}{TA_0}$	*Size*
RD	*1*				
D/W	*-.06621*	*1*			
$\frac{M_E}{B_E}$	*-.05348*	*-0.38721*	*1*		
$\frac{CF - CMLTD_0}{TA_0}$	*-0.08748*	*-0.00671*	*.16496*	*1*	
Size	*0.059154*	*0.069997*	*0.067416*	*.287542*	*1*

Table 3. Significance of Variables

Table 3 reports the Coefficient and t statistic for each variable for the year following the year the firm entered financial distress

	2002		2003		2004		2005		2006	
	Coefficient	t stat	Coefficient	t stat	Coefficient	t stat	Coefficient	t stat	Coefficient	t stat
Intercept	62.302	1.274	-25.143	-1.458	-35.331	-2.259	-57.855	-3.59	.8367	.0285
D/W	-0.721	-1.048	0.909	1.811	0.769	2.447	1.114	2.859	0.5848	1.178
P/B	-6.589	-0.496	-13.464	-2.375	.757	.220	-4.634	-1.999	-11.624	-1.67
SIZE	-0.019	-2.669	0.0007	2.421	.0007	.3311	.007	2.599	.004	1.147

Based on these results a trading strategy can be formed to realize abnormal returns. Following the second hypothesis of this paper, the trading strategy involves purchasing a firm in financial distress, and shorting the industry leader. Furthermore, size and price to book can emphasize the returns. In a sample of experiencing financial distress in a given year that is sorted based on size the half of the firms should realize average returns of 12.5%, where as the smaller half should realize average returns of around 7.81%. If the same sample is divided into quartiles greater returns can be realized. As seen in table 3 below the second largest quartile on average had the highest returns of 24.04% followed by the third and fourth largest with returns of 11.07% and 4.56% accordingly.

Table 4. Quartile return based on firm size N=93

Table 4 reports the mean percentage returns of firms minus the return of the industry leader separated into quartiles from largest to smallest base on firm size of the distressed firm.

Quartile	Return $r_{fd} - r_l$
1	.009734
2	.2404***
3	.1107
4.	.0456

***significant at the 1% level

If the same sample is sorted by price to book similar results can be found. As seen in table 4 the quartile with the largest price to book, or growth firms, realize the largest returns of 34.75%, and the following three quartiles realized returns of 22.74%, 14.46% and 5.54% accordingly the year after the firm entered financial distress.

Table 5. Quartile return based on price to book N=93
Table 5 reports the mean percentage returns of firms minus the return of the industry leader separated into quartiles from largest to smallest based on price to book of the distressed firm.

Quartile	Return $r_{fd} - r_l$
1	.3475**
2	.2274**
3	.1446
4	.0554

**Significant at the 5% level

Conclusion

The results provide support of the hypotheses that firms in financial distress are oversold as a result the year after the firm enters financial distress the firm value will bounce back and experience abnormal returns. Also the results provided evidence that price to book is an indicator of the amount of returns on the stock. This suggests a trading strategy of shorting the industry leader, and longing the firm in financial distress. The returns can be maximized by sorting the distressed firms into quartiles, and purchasing the firms with the highest price to book. This trading strategy should yield an average annual return of 34.75%

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